

WHAT IS CLAIMED IS:

- 1 1. A peristaltic pump comprising:
2 a plurality of movable occluding surfaces;
3 a plurality of independently movable occlusion fingers, wherein the
4 plurality of fingers are integrally formed as a single unitary body; and
5 a plurality of springs independently resiliently biasing the plurality of
6 occlusion fingers.
- 1 2. The pump of Claim 1, wherein the springs comprise leaf springs.
- 1 3. The pump of Claim 1, wherein the springs are integrally formed as
2 part of a single unitary body.
- 1 4. The pump of Claim 1 including rollers rotatably supported
2 proximate the tubes, wherein the rollers provide the occluding surfaces.
- 1 5. The pump of Claim 1, wherein each finger includes a channel
2 partially receiving one of the tubes.
- 1 6. The pump of Claim 1, wherein the fingers extend along an arc.
- 1 7. The pump of Claim 1 including fluid couplers supported adjacent
2 each of the occlusion fingers.
- 1 8. The pump of Claim 1 including a channeling member supported
2 proximate the fingers.
- 1 9. The pump of Claim 1, wherein the fingers are integrally molded as a
2 single unitary body out of a polymeric material.
- 1 10. The pump of Claim 1, wherein the fingers pivot about a common
2 axis.

1 11. The pump of Claim 1, wherein the occluding surfaces move along a
2 path into and out of engagement with the tubes and wherein the fingers pivot
3 about a substantially common axis adjacent the path.

1 12. The pump of Claim 1, wherein the occluding surfaces rotate about
2 a first common axis and wherein the springs pivot about a second axis parallel
3 to the first axis.

1 13. The pump of Claim 1, wherein the occluding surfaces move along a
2 path into and out of engagement with the tubes, wherein each of the fingers
3 has a first end and a second opposite end and wherein the first end and the
4 second opposite end extend adjacent to the path.

1 14. The pump of Claim 1 including:
2 fluid conduits fluidly coupled to the pumping tubes; and
3 a holder coupled to the fingers and the springs, wherein the holder
4 includes a surface against which the fluid conduits extend.

1 15. The pump of Claim 14, wherein the holder is removably and
2 directly coupled to the fingers without fasteners.

1 16. The pump of Claim 15, wherein the springs are removably and
2 directly coupled to the holder without fasteners.

1 17. The pump of Claim 16, wherein the springs are releasably coupled
2 to and engaging to the fingers without fasteners.

1 18. The pump of Claim 14 including fluid couplers coupled to and
2 supported by the holder.

1 19. The pump of Claim 14 including a channeling member extending
2 from the surface.

1 20. The pump of Claim 1 including pumping tubes, wherein the
2 occluding surfaces move along a path into and out of engagement with the
3 tubes and wherein the pump further includes:
4 first fluid couplers connected to a first end of the pumping tubes
5 adjacent the path; and
6 second fluid couplers connected to a second end of the pumping
7 tubes adjacent the path.

1 21. The pump of Claim 1 including fluid couplers coupled to and
2 supported by fingers.

1 22. The pump of Claim 1 including a tube channeling member
2 supported proximate the fingers.

1 23. The pump of Claim 1 including:
2 pumping tubes; and
3 first fluid conduits fluidly coupled to a first end of the pumping
4 tubes, wherein the pumping tubes have a first flow area of cross sectional flow
5 area and wherein the first fluid conduits have a second smaller interior cross
6 sectional flow area.

1 24. The pump of Claim 23 including fluid couplers between the
2 pumping tubes and the first fluid conduits.

1 25. The pump of Claim 23, wherein the pumping tubes extend on a
2 first side of the fingers and wherein the first fluid conduits extend on a second
3 opposite side of the fingers.

1 26. The pump of Claim 25 including second fluid conduits fluidly
2 coupled to a second opposite end of the pumping tubes, wherein the second
3 fluid conduits extend on the second side of the fingers.

1 27. The pump of Claim 23 including second fluid conduits fluidly
2 connected to a second opposite end of the pumping tubes.

1 28. The pump of Claim 27, wherein the pumping tubes each have a
2 first interior cross sectional flow area and wherein the second fluid conduits
3 each have a second smaller interior cross sectional flow area.

1 29. The pump of Claim 23 including fluid sensors at least proximate an
2 interior of the pumping tubes.

1 30. The pump of Claim 23 including fluid couplers connected to the
2 pumping tubes, wherein the fluid sensors are located within the fluid couplers.

1 31. A peristaltic pump comprising:
2 movable occluding surfaces;
3 independently movable occlusion fingers;
4 springs independently resiliently biasing the plurality of occlusion
5 fingers, wherein the springs are integrally formed as part of a single unitary
6 body; and
7 a drive system configured to move the occluding surfaces.

1 32. A peristaltic pump comprising:
2 movable occluding surfaces;
3 independently movable occlusion fingers;
4 springs independently resiliently biasing the occlusion fingers; and
5 fluid couplers supported by the fingers.

1 33. A peristaltic pump comprising:
2 pumping tubes, each tube having a flexible wall portion;
3 movable occluding surfaces on a first side of the pumping tubes;
4 independently movable occlusion fingers on a second opposite side
5 of the tubing tubes;
6 springs independently resiliently biasing the occlusion fingers
7 towards the pumping tubes;
8 a drive system configured to move the occluding surfaces so as to
9 compress the tubes against the fingers; and

fluid couplers connected to the pumping tubes, wherein at least one of the fluid couplers includes a fluid sensor.

34. A peristaltic pump comprising:
movable occluding surfaces;
an occlusion including:
a base portion; and
occlusion fingers pivotally coupled to the base portion;
a holder releasably and directly coupled to the base portion of the occlusion without fasteners;
a spring system including:
a base portion releasably and directly coupled to the holder without fasteners; and
springs extending from the base portion into engagement with the fingers; and
a drive system configured to move the occluding surfaces.

35. A peristaltic pump comprising:
fluid passages, wherein each fluid passage includes a compressible portion;
a first unit having independently movable surfaces adjacent the compressible portion of each of the fluid passages;
a second unit having biasing means for resiliently biasing the occlusion surfaces against movement away from the compressible portions; and
means for compressing the compressible portions of the fluid passages to move fluid along the fluid passages.

36. An occlusion for use in a peristaltic pump, the occlusion comprising:
independently movable occlusion fingers, wherein the fingers are integrally formed as a single unitary body.

1 37. The occlusion of claim 74, wherein each of the fingers includes
2 means for retaining a tube in place.

1 38. The occlusion of claim 74, wherein each of the fingers is
2 configured to support a fluid coupler.

1 39. A spring system for use in a peristaltic pump, the spring system
2 comprising:
3 a base portion; and
4 resilient spring fingers extending from the base portion, wherein the
5 base portion and the resilient spring fingers are integrally formed as part of a
6 single unitary body.

1 40. A printer comprising:
2 an ink dispensing pen;
3 ink reservoirs; and
4 a pump comprising:
5 pumping tubes in fluid communication with the ink reservoirs
6 and the ink dispensing pen, each tube having a flexible wall portion;
7 movable occluding surfaces on a first side of the pumping
8 tubes;
9 independently movable occlusion fingers on a second
10 opposite side of the pumping tubes, wherein the fingers are integrally formed as
11 a single unitary body; and
12 springs independently resiliently biasing the occlusion fingers
13 towards the pumping tubes; and
14 a drive system configured to move the occluding surfaces so as to
15 compress the tubes against the fingers.